

to the scheme, such as it is. Whether it will be a success or not will depend upon matters which we cannot discuss to-night. It will depend largely upon the men and upon the methods by which the work is carried out. No one doubts that there is a need for it at the present time. The Right Hon. gentleman has enumerated some of the things in connection with which we have discovered the need, and he could have made a much longer list—things which are vitally important for the carrying on of the war. This country has had brought home to it the recklessness of any island country being dependent for its supplies to a large extent upon places outside its bounds. That is one of the lessons we shall learn from the war. It must be remembered that scientific men have been connected with agriculture and industry in this country before. They were connected with it in the best possible way; they were present while the work was being done. But in one case after the other the Germans bought up those firms and practically carried the industries away to Germany. We must not have that occur again. It is not merely a question of scientific research; it is much more a question of policy. So far as the scientific side is concerned, I think that even the President of the Board of Education was scarcely sufficiently optimistic when speaking of the enormous supply of men in the universities who are perfectly qualified and ready to take part in the industrial side of science. A large number are already doing so, and a very much larger number are perfectly ready and willing to take part and assist in the science of industries of any kind.

DR. ADDISON: There are many things which we must attend to without any delay, and it is for this reason that the Committee for Research will be set up quite soon. A great deal has been done by private effort in respect of research, and notwithstanding all that my hon. friend the Member for West Clare (Mr. Lynch) has pointed out, quite properly, in this connection, I think that the research which has been associated with British men of science has often been the most original of any in the whole world. We have not organised and developed it as we ought to have, but the British researcher is often freer in his outlook and greater in his conceptions, I think, than almost any other. At all events, he certainly stands far above the average German researcher, who tends more to apply the ideas which have been suggested by others, but from all that my hon. friend pointed out we have got to recognise that we cannot afford nowadays to leave all this to private effort. A great deal can be done by careful organisation and by seeing that the men turned out from our universities and technological institutions are equipped with that training which will make them acceptable in industry, and make them more likely to find a good market and a good career for themselves. Going around our institutions you will find certain departments where the professors will tell you that they cannot supply the men quickly enough to the manufacturers, while in other departments it is quite the reverse. The Royal Society has lately, very patriotically, been assisting chemical research in respect of drugs. This was one of the matters in which we felt ourselves behindhand at the beginning of the war. However, I think that my Right Hon. friend may be satisfied with the full assent of the House in all quarters in getting ahead with this great scheme, which, while we hear so much of the mobilisation of our industries with respect to the production of munitions of war, will quickly, for the first time in this country, show that we are going to some extent, at all events, to create a machine which will enable us to mobilise brains and science in the service of industry and national progress.

NO. 2377, VOL. 95]

NOTES.

THE annual visitation of the Royal Observatory at Greenwich will be held on Saturday, June 5.

SIR WILLIAM CROOKES and Prof. R. Meldola have been elected honorary members of the Society of Public Analysts.

WE learn with regret of the death, on May 8, of Dr. P. Zeeman, since 1902 professor of geometry and theoretical mechanics in the University of Leyden.

PROFS. MAURICE CAULLERY (Paris), Charles Henri Marie Flahault (Montpellier), and Jacques Loeb (Chicago) have been elected foreign members of the Linnean Society.

THE London County Council has decided to commemorate the residence of Lord Lister in London by placing a memorial tablet on the house, 12 Park Crescent, Marylebone Road.

WE regret to announce the death on May 13, in his eighty-ninth year, of Dr. M. W. Crofton, F.R.S., formerly professor of mathematics at Queen's College, Galway, and also, later, professor of mathematics and mechanics at the Royal Military Academy, Woolwich.

SIR DAVID BRUCE will this year deliver the Croonian lectures at the Royal College of Physicians of London on June 17, 22, 24, and 29. His subject will be "Trypanosomes causing Disease in Man and Domestic Animals in Central Africa."

AT the annual meeting of the Iron and Steel Institute last week, the Bessemer gold medal of the institute for 1915 was, in the unavoidable absence of the French Ambassador, handed to M. de Fleureau, councillor of the French Embassy, for transmission to M. Pierre Martin, for his invention of the open-hearth system of steel manufacture.

THE regents of the American College of Surgeons announce the appointment of Dr. J. G. Bowman as director of the college. The college was founded in 1913, and is an organisation of the surgeons of the United States and of Canada, having for its purpose the advancement of the art and science of surgery. The address of the executive offices is 30 North Michigan Avenue, Chicago.

THE trustees of Columbia University, in the city of New York, have awarded the Barnard gold medal to Prof. W. H. Bragg, Cavendish professor of physics in the University of Leeds, and his son, Mr. W. L. Bragg, fellow of Trinity College, Cambridge, and a member of the college staff, at present holding a commission in the Leicestershire R.H.A. (T.F.), for their work on X-rays and crystals. The medal is awarded every five years for "meritorious service to science," on the recommendation of the National Academy of Sciences of the United States. The previous recipients have been Lord Rayleigh and Sir William Ramsay, Prof. von Röntgen, Prof. Henri Becquerel, and Sir Ernest Rutherford.

A PARTIALLY restored skeleton of a small ancestral camel, *Stenomylus hitchcocki*, from the Lower Miocene of Nebraska, U.S.A., has just been added to the

exhibited collection in the geological department of the British Museum (Natural History). The specimen was obtained from Prof. F. B. Loomis, of Amherst College, Mass., who discovered the remains of a herd of these small animals which had been suddenly destroyed and buried by some local accident. As a camel, *Stenomylus* is remarkable for its extremely slender build, which would render it as agile as a gazelle. It also has molar teeth with unusually deep crowns, so that it would be able to feed on hard and dry grasses. It was therefore more completely adapted for life on open plains and uplands than the other camels which abounded in North America in Oligocene and Miocene times.

THE death is announced in *Science* of Mr. E. W. Morse, formerly instructor in natural history at the Bussey Institution of Harvard University, whose name is associated with his contributions to the history of domesticated animals. Mr. Morse more recently acted as a specialist in animal husbandry in the U.S. Department of Agriculture. In addition to his official duties as an associate editor of the *Experiment Station Record*, and later as an expert in the U.S. Dairy Division, Mr. Morse was instrumental in putting the foundations of animal breeding and feeding on firmer bases. He was an active member of the Biological Society of Washington, the American Society of Animal Nutrition, and the Boston Society of Natural History, and a regular contributor to several standard year-books and encyclopædias.

THE issue of *Science* for May 7 announces the completion of the rebuilding of the Gray Herbarium in connection with Harvard University. The work of enlargement and rebuilding was begun in 1909, and has been carried out a section at a time as the generosity of many benefactors made extension possible. The herbarium dates from 1864, when the late Mr. Nathaniel Thayer gave a building to house the botanical collections which Asa Gray had presented to the University. The primary ideals followed in rebuilding have been those of safety, permanence, and convenience of arrangement, but the elevation of the new structure gives the impression of dignified simplicity and great solidity. During the whole period of reconstruction the herbarium and its library have been open as usual for consultation.

ENGINEERS in many parts of the world will notice with regret that the name of Dr. Fred Stark Pearson appears in the list of those lost in the *Lusitania*. We are indebted to the *Engineer* for May 14 for the following particulars of Dr. Pearson's career. He was widely known on account of the construction of many notable reservoirs for water supply in sub-tropical countries, his first great work of the kind being undertaken in the Republic of Mexico. He became a director of the Puebla Tramway, Light and Power Company, owning five different properties in the Republic of Mexico, and from his long and intimate association with these enterprises he became acquainted with other industrial openings in Latin-America. Gradually he took up interests in concessions, and lent his great talents to the development of many similar enterprises in Mexico, Argentina, Brazil, Paraguay, and Texas.

NO. 2377, VOL. 95]

Perhaps Dr. Pearson's most notable enterprise was in connection with the design for, and the construction of, the great hydro-electric station at Necaxa, Mexico, and the construction of a transmission line to a distributing station erected at the city of Mexico, situated some ninety-five miles distant. The success achieved by Dr. Pearson in connection with these Mexican enterprises led to his association with similar projects in different parts of the world, and to his becoming what he at first never intended to be—a company promoter and professional director. In addition to his membership of the American institutions, he was a member of the Institution of Civil Engineers.

By the death of Lieutenant Thomas Wright, who was killed while reconnoitring at night on Sunday, May 2, the staff of the faculty of science at King's College, London, has lost one of its most promising younger men. Mr. Wright studied chemistry under Prof. J. M. Thomson and Prof. Herbert Jackson from 1908 to 1912, completing his course with the associateship of the Institute of Chemistry and first-class honours at the B.Sc. examination. Soon after graduation he was appointed demonstrator in chemistry, and during his short tenure of this post he displayed the greatest energy in teaching science students of all faculties and many races. He came of yeoman stock, and his practical and intimate knowledge of agriculture added to the value of his chemical studies, and although he was not spared to complete any original research, he had already given proofs of an ability, power of observation, and keen insight which would have been of great value at the present time, when the nation so sorely needs numbers of such young men of science. In 1914 Mr. Wright gained an Anglo-German scholarship on the Cassel Foundation, the only one awarded outside Oxford or Cambridge. He was to have proceeded to Germany for further study and research, but the outbreak of war found him under arms as a trooper in King Edward's Horse. He received a commission in the Berkshire Regiment in December, 1914, and was sent out to France in the early spring. As an officer he displayed the same ability, zeal, and initiative which had characterised his all too brief career at King's College. His death means a serious actual loss to his college and potentially to science also, while all who knew him mourn that such a promising life should have passed into silence.

IN *Man* for May, Mr. K. A. C. Cresswell supplements from another field the very interesting paper by Prof. J. L. Myres on the causes of rise and fall in the population of the ancient world (*Eugenics Review*, vol. vii., p. 15), which was practically confined to one field, the Mediterranean. He now extends the survey to Mesopotamia, Persia, and Central Asia. He dwells on the importance of irrigation in the agriculture of these regions, and on the fact that there is historical evidence to show that ages of warfare caused the decay of the canal and karez systems of water supply. He is therefore led to the conclusion that the chief cause of the great fluctuations of the population in these regions has been the collapse of the irrigation system, and that but for this neither war nor mis-

government would have sufficed to bring it about, although Ellsworth Huntington has shown that general desiccation has been a factor. Increase of conserved rainfall follows extension of irrigation, and it is suggested that, the chlorophyll reaction being endothermic, there must be a perceptible lowering of the temperature over large tracts of cultivation. If this is the case, it may possibly have an appreciable effect on condensation.

MESSRS. C. G. SELIGMANN and F. G. PARSONS describe, in the *Journal of the Royal Anthropological Institute* for July-December, 1914, a skeleton found in 1903 at Gough's Cave, Cheddar. It is that of a young adult male whose stature was about 5 ft. 4½ in. It was found in association with implements of the late Palæolithic or Magdalenian period. The cranium shows a fairly close resemblance to that of the River Bed type from whom, in the present state of knowledge, the writers believe the Neolithic people to be descended. There are marked contrasts between the Cheddar skull and two of the Aurignacian age with which the writers are familiar, and though the face and the cranium, except that the latter is long, differ rather markedly from those of the Saxons, the cranium alone could not be distinguished from that of a medieval Englishman. The face and orbits are, however, very different. The conclusion arrived at is that the similarity of the Cheddar and English medieval skulls is not so much a sign of racial affinity, as an indication that among the latter a cranium closely resembling that of the River Bed type had been produced incidentally by numerous crosses.

THE Royal Zoological Society of Dublin is to be congratulated, inasmuch as it possesses the only living gorilla in Europe. But, according to the *Irish Naturalist* for May, their captive has been suffering from a tumour on the right side of the neck and face. A microscopic examination of the pus obtained therefrom showed that the growth was due to actinomycosis. This much having been discovered, it became possible to determine on a suitable course of treatment, which we are glad to note gives promise of success. Having regard to the rarity of gorillas in captivity, and the importance of the results of a study of their habits, it is devoutly to be hoped that a complete cure will be effected.

EXPERIMENTS in acclimatisation should never be undertaken save when they promise to yield some definite and worthy end. But what appears to be a quite harmless venture has been made on Lambay Island, Co. Dublin, where, according to the *Irish Naturalist* for May, more than two thousand reptiles and amphibians have been turned out. For economic reasons Dr. Scharff, the director of the Dublin Museum, now suggests an addition to this number in the diamond-backed terrapin (*Malacoclemmys terrapin*). This species he considers might do well in the harbour, since it lives in North America in salt marshes, feeding on molluscs and crabs. In this event a lucrative "fishery" might in course of time be established, since in America terrapin stew—and champagne sauce—is held in high regard.

Two very interesting articles bearing on the problems of sexual selection will be found in the May number of *Wild Life*. The first, which is all too short, is by Mr. H. B. Macpherson, who describes the "tournament" of the blackcock, illustrating his remarks by some admirable photographs. The second is from the pen of Mr. Edmund Selous, and describes the early breeding habits of the shag. Anything Mr. Selous writes about the courtship of birds is sure to be interesting, and this account of the shag is no exception to the rule. His notes seem to show that, as with the Phalaropes, and some other species, the sexual rôle is reversed in the matter of courtship, the advances being made by the female. This being so, the assurance that polyandry prevails with this species is not surprising, though the evidence produced to favour this view is by no means convincing.

THE characteristics of molybdenite are discussed in a short but interesting article in the *Scientific Australian* for March. Since the outbreak of the war the price of this mineral has advanced from 60*l.* to 725*l.* per ton. Happily for us, more than half of the molybdenite ore of the world is obtained in Australia. Though principally used for hardening steel—armour plate containing about 20 per cent. of molybdenite—it is also used for the preservation of certain explosives and as a substitute for tungsten, while the salts of molybdenum furnish a blue pigment used in colouring porcelain and in the dyeing of silk and woollen goods. The normal method of washing the ore proving very wasteful, the experiment of oil flotation is being tried, and promises to effect a great saving. Experiments by the United States Bureau of Mines in smelting molybdenite ores electrically are also being made, and these have shown that ferro-molybdenum, low in carbon, can be made directly from molybdenite in the electric furnace, with excess of lime as a desulphurising agent, and that the sulphur can be readily slagged off as calcium sulphide.

THE appalling rate at which the extermination of the native fauna of Australia is proceeding is tersely told by Mr. W. H. Le Souef in the *Scientific Australian* for March. The ravages of foxes and feral cats, introduced by settlers, is answerable for much of the mischief that has been done. The fox, he remarks, "will in course of time overrun the whole of Australia—it is half over already—and in consequence all ground game . . . will suffer severely." The loss to Australia cannot well be computed in cash, as, besides native game, the fox destroys young lambs, turkeys, geese, ducks, and other domestic poultry. The introduction of the rabbit has proved no less disastrous. The realisation that these agents of destruction need never have been introduced makes the consequences the more deplorable. The inevitable removal of timber and scrub, the drainage of swamps, and the erection of miles of wire fences have proved even more speedy and complete factors of elimination. Wire fences alone have accounted for the deaths of thousands of emus and kangaroos, which are now prevented from making their customary migrations in search of water, and consequently die maddened with thirst. Mr. Le Souef pleads for an

increase in the number of sanctuaries, and we trust his appeal will not fall on deaf ears.

THE British Museum of Natural History and the Zoological Society are both setting a good example in their endeavour to arouse in the public a more lively sense than hitherto of the dangers which beset us, and especially this year, from the flies which invade and infect our food and drink. In the central hall of the Natural History Museum Dr. W. G. Ridewood has displayed a small case containing most realistic models of various kinds of food and drink and kitchen refuse, all of which are being partaken of by hosts of flies. Clearly-worded labels and diagrams enable the visitor to assimilate at a glance the nature of these scourges and the best way to combat them. Prof. H. Maxwell-Lefroy, at the Zoological Gardens, has entered much more fully into the matter, having prepared an exhibition of living flies and their larvæ, supplemented by specimens preserved in spirit, with samples of various kinds of kitchen refuse which serve as a nidus for these pests. Wall diagrams and lantern slides arranged as transparencies, showing the different kinds of flies and the essential details of their anatomy, add materially to the usefulness of this part of the exhibition. Having thus demonstrated the magnitude of this menace to the community, he proceeds to point out various preventive measures by means of fly-traps, poisons, and fumigatories. Specimens of each are ranged around the room, and all have the merit of being at once cheap and easily and safely used by the careful housewife.

THE Journal of the Royal Society of Arts for April 23 contains a paper by Mr. Moreton Frewen on the State and the fisherman. After dealing with instances of successful fish culture by the United States Fish Commission, Mr. Frewen proceeds to consider the marine fisheries of British Columbia. These are very prolific. There are extensive feeding and spawning grounds for herring, cod, halibut, and many other food fishes, while salmon are very abundant in the great rivers. During the last year or so fairly large quantities of North Pacific halibut have been exported to this country. Dealing more particularly with the Charlotte Islands, the author contends that there is, in that area, a magnificent opportunity for fisheries development on a large scale. Railway and harbour developments in recent years seem to solve the problem of profitable distribution of the fish reared, caught, or canned. A large part of the paper is devoted to the consideration of the establishment of fisher-colonies in British Columbia, formed from partially disabled ex-soldiers and ex-sailors, and from those more adventurous men who will return to civil life on the conclusion of the war. Everything, he contends, points to the great commercial development of this part of our overseas dominions, provided that the State may foster, by scientific investigation and well-planned emigration proposals, its great natural resources.

THE water relationship between the soil and the plant has been the subject of numerous investigations,

and it has received further attention from Pulling and Livingstone in a publication recently issued from the Carnegie Institution of Washington (No. 204). One of the authors had previously insisted that the power of the soil to deliver water to root surfaces is the prime external condition determining the moisture supply to plants in normal soils. An osmometer was therefore constructed to obtain information on the phenomena involved, and measurements were taken showing the rate at which water passed from the soil into the cell. For this purpose the large end of the thistle funnel was closed with a collodion membrane obtained by evaporation of a solution of Schering's "celloidin" in a mixture of equal parts of alcohol and ether. This membrane, when properly made, was found to be practically impermeable to dissolved substances, although it readily allowed the passage of water. A cane-sugar solution was introduced, and the instrument was buried in the soil with proper precautions to ensure continuous contact. The rate at which water entered was assumed to indicate the power of the soil to deliver water to the root. It is admitted that the phenomena are complex, but the authors urge that in the present stage more good will result from a direct study of the property as such than from any attempt to analyse it into its component factors. Temperature was found to be of great importance in determining the water-supplying power. A critical point was also found which is said to be approximately the same as that observed by other investigators.

ITALY has taken in hand the study of its own glaciers, and its Società per il Progresso delle Scienze publishes the first number of a *Bolletino del Comitato glaciologico italiano* (Rome, 1914, pp. 1-114, with illustrations). This, after a prefatory statement, gives a bibliography of Italian glaciology from 1895 to 1913, and some reports on investigations in 1913. Prof. A. Roccati describes some glaciers in the Maritime Alps, the largest of which begins at 9219 ft. and ends at 8662 ft. This, like other Alpine regions where the summits rarely attain to 10,000 ft., should afford good illustrations of upland valleys from which glaciers have not long disappeared. Prof. F. Porro furnishes a preliminary report on the Italian Miage Glacier, which has long been noted for the size of its moraines and its marked advances and retreats. Prof. D. Sangiorgi describes the glaciers eleven of them considerable, from the Disgrazia to the Monte di Zocca. An easily recognised granite occurs in this mountain group, boulders from which are found even to the south of Como. In the Monte Rosa group Dr. Monterin deals with the Lys Glacier and that of the Val d'Ayas, of which the former, like the Gorner Glacier, is still retreating; and the *Bolletino* ends with studies of two glaciers on the Weisshorn or Corno Bianco (10,893 ft.), a peak on the ridge separating the above-named valleys. Altogether a very promising first number, but we hope that the Comitato will keep in touch with the *Zeitschrift für Gletscherkunde*, for a multiplication of separate periodicals is apt to increase rather than diminish the difficulties of those interested in the history of glaciation.

THE Società per il Progresso delle Scienze publishes in two small parts a summary (*Spedizione Asiatica*) of the remarkable work done by Dr. Filippo de Filippi in the Karakoram-Himalayas, but as this is even briefer than the accounts which have been already given in the *Geographical Journal*, we may await the volume, which will in due course appear, to supplement the one which described the exploring journeys in which he took part under the leadership of the Duke of the Abruzzi. Evidently Dr. de Filippi with his well-equipped expedition has succeeded, during an expedition lasting about sixteen months, in adding greatly to our knowledge of the physiography and petrology of a region in which Mont Blanc would be an inconsiderable peak.

IN interferometers it has been found convenient to introduce into the path of one of the two interfering beams a plate of plane parallel glass of which the angle of inclination to the beam traversing it could be varied. By this means the optical length of the path could be increased by increasing the inclination of the plate to the path traversed. According to a note by Mr. L. H. Adams, of the U.S. Geophysics Laboratory, published in the *Journal of the Washington Academy of Sciences* for April 19, a complete theory of the action of such a plate has not previously been available, and he supplies it. A number of important deductions may be made from the theory, one of which is the small effect of the index of refraction of the glass on the sensitiveness of the plate as a compensator.

A RECENT paper by Mr. W. Calder on oil-well engineering, read before the Institution of Petroleum Technologists on April 30, is well worthy of the attention of all interested in this highly specialised branch of engineering, and perhaps especially of young men who may be intending to devote themselves to this particular department. In this country, where no practical experience in oil-well technology can be obtained, there is perhaps too great a tendency to regard the subject almost exclusively from the geological viewpoint, and this paper comes opportunely to lay emphasis upon the engineering aspect of the work. It makes it very clear that, although for the location of the borehole the services of the geologist are indispensable, yet all the subsequent work depends for its success upon the engineering abilities of the man in charge. Well-drilling is purely a matter of mechanical engineering, and requires for its successful execution not only a thorough mechanical training, but an amount of resourcefulness and ingenuity that can never be acquired unless by men in whom the engineering instinct is innate. Mr. Calder's paper brings the whole subject well up to date, and describes a number of the most modern drilling devices, which, though quite familiar to oil-well engineers, are by no means adequately dealt with in the general literature of the subject; it is therefore an exceedingly useful contribution to oil-well technology.

THE twin sciences of heating and ventilation have received little attention in their scientific aspects. In

a paper read before the Society of Engineers on May 11, Mr. A. H. Barker dealt with a few of the difficulties of these subjects. He pointed out that physiologists are not even agreed upon what was a healthy temperature for human beings to live in. The heating and ventilating engineer aims at producing comfort, but is baffled by the fact that a man is comfortable only when he thinks he is. Air which, judged by chemical analysis, is impure, may feel fresh and sweet, and *vice versa*. The only legitimate function of the engineer is to produce and control specified movements of air and other effects, while it should be the duty of the physiologist and hygienist to specify what are healthy and comfortable conditions. In connection with heating, the expression "temperature of a room" is generally understood to mean the reading of a thermometer suspended in the room, but this reading does not necessarily indicate the temperature of the surrounding air, or form a trustworthy guide to the feelings of the occupants of the room. The air temperature, the radiant temperature, the quantity of convected heat and the quantity of radiant heat must all be determined, but first the relation between the thermometer reading, the air temperature, and the radiant temperature must be determined. The freshness of air in a building depends on keeping the air temperature relatively low and the radiant temperature high. The chemical composition of the air has, within wide limits, no effect on the human organism, whereas its temperature and humidity are very important. The paper described experiments made at University College, London, and the apparatus used in connection with them, and discussed briefly some problems which it is sought to solve experimentally.

A PAPER on the distribution of heat in the cylinder of a gas engine was read before the Institution of Mechanical Engineers on May 14, by Prof. A. H. Gibson and Mr. W. J. Walker. The paper gives account of a series of tests made at University College, Dundee, in order to determine the jacket loss at different speeds. The engine, built by the National Gas Engine Co., Ltd., has a cylinder diameter of 11 in., and a stroke of 19 in. The water jacket is divided into two separate parts, one of which surrounds the exhaust-valve, and the other surrounds the breech-end and barrel of the cylinder. With the strongest mixture, and at full load, the percentage heat transmitted to the cylinder jacket is 1.10 times as great at 150 revs. per min. as at 250 revs. per min., while with the weakest mixture the ratio becomes 1.23. At 150 revs. per min. the period of contact per cycle, of hot gases and cylinder walls, is 1.66 times as great as at 250 revs. per min., and the rate of transmission of heat is evidently much greater at the highest speed. The indicator diagrams show that the maximum temperature attained in the cylinder is approximately 6 per cent. greater at 150 than at 250 revs. per min., so that the increased rate of transmission is obtained in spite of a lower gas temperature. The reason lies apparently in the fact that the greater turbulence of the working fluid at the higher speeds increases its effective conductivity to an extent which more than counterbalances the other factors.